Biological Early Warning Systems in Drinking Water Production

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Biographical Sketch of Author

Dr Peter G Stoks graduated from Nijmegen University, Netherlands, where he also took his PhD (1982). Following a post doctorial at Amsterdam Free University (Dept of Analytical Chemistry) he was appointed Head of the Analytical Laboratories at the Dutch Nat'l Water Authority RIZA. In 1991 he became Directory Board member & Head of the Water Quality Dep't of the WRK Water works, Nieuwegein, Netherlands. His special interests are water quality assessment strategies and Early warning. He is actively involved in the International Association of Water Works along the Rhine (IAWR), where he is a member of the Scientific Research Program Committee.

Abstract

The WRK Water Works is responsible for the abstraction and partial purification of surface water for the drinking water production of well over 2 million people in The Netherlands. Two water winning stations, one at a side canal of the river Rhine, the other at IJsselmeer lake provide an annual total capacity of 260 Mm^3 / year. In view of the dense population and industrialization upstream (over 20 million people) and the heavy shipping traffic on the Rhine river, the control of water quality variations due to, eg. accidental spills, is of paramount importance. An early warning system is, therefore, in operation. In addition to "classical chemistry" such as on-line measurements of temperature, pH, conductivity and turbidity, immunological as well as highly advanced chemical screening techniques are employed. However, using these chemical techniques it is only possible to detect and identify a restricted number of substances. Numerous other pollutants may occur, that cannot be detected and/or that may have unknown toxic properties. For added insight, notably regarding the occurrence of toxic effects resulting from spills, bio-alarming devices have been added. These include on-line fish and algae monitors as well as light-emitting bacteria. Although there have been several intake stops due to pollutants detected by the chemical early warning system, no stops have yet been based solely on bio-alarms, mainly because the cause of such an alarm cannot be found. Research in this direction, based on EPA's TIE philosophy has recently begun as a joined project with a Dutch research institute TNO.